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ABSTRACT

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DIFFERENT LEARNING STYLES: VISUAL VS. NON-VISUAL LEARNERS MEAN RAW SCORES IN THE VOCABULARY, COMPREHENSION, MATHEMATICAL COMPUTATION, AND MATHEMATICAL CONCEPTS

by: Marvin Brent Roark

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Abstract

This study attempted to show that students that are classified as visual learners will score higher on standardized tests than those students that are classified as non-visual learners because visual learners possess the traits needed to do well on standardized tests. The study used (33) visual and (33) non-visual adult learners in the adult basic educational program at Putnamville Correctional Facility as the sample group. The Vocational Learning Styles Inventory, Piney Mountain Press, Inc., was used to determine the learning style of each student used in the study. The Test for Adult Basic Education (T.A.B.E.) was the standardized test administered. The mean scores were taken from both groups in the following areas: vocabulary, comprehension, math concepts, and math computation. The mean scores from each group were compared using a computer program which calculated an independent two tailed t-test score for each area. Standard deviation, t-values, and significance was calculated for each area tested. The visual learners group had higher mean scores than the non-visual learners group in all areas assessed.

Background

Because no two people learn in exactly the same way or at the same speed, future educators have to be able to adapt curriculum and learning activities to address their students' learning styles. It is important for all educators not only to discuss styles but to model methods by adapting to their pre-service teachers' styles. Future teachers can then be more adept at meeting the needs of their own students during field experiences and student teaching. Addressing various learning styles is a more effective way of addressing diversity than a superficial attempt to learn about customs and holidays.

Learning styles can be defined as the various ways learners process and organize information as they interact within their environment. Students with different learning styles tackle learning in different ways. They have preferred ways of processing and organizing information. Teachers and students whose learning styles match each other usually have no difficulty in communicating about subject matter. However, when the teacher's style is different from the students' styles, miscommunication or lack of understanding can occur. An effective educator will adapt teaching styles to meet the variety of styles of students in the classroom. It is not possible to match every style during each activity, but it is possible to address a variety of styles within a few days by using different types of learning activities.

There are several theorists who have described learning styles. Rita and Kenneth Dunn studied classroom experiences and identified four dimensions in which styles differ: (1) environment, (2) emotional support, (3) sociological composition, and (4) personal/ physical elements. Ask five students their definitions of a conducive place to learn and they

will probably describe five different definitions. Environmental preferences may be related to sound, light, temperature, and seating design. One student might possibly prefer sitting in a straight chair at a desk with a table lamp in a cool room. Another might possibly prefer a warm room with a bean bag chair under fluorescent lights with music playing in the background (Feaster, 1998).

Emotional support relates to the extent to which students are self-starters. One student may be able to develop and keep his own schedule for a long-term assignment; another may need various check points along the way to keep him or her on task. Sociological support involves whether students like to work alone, in pairs or teams, with an adult, or in a variety of social situations. Effective teachers will provide opportunities for all types of interaction. Dunn and Dunn's final dimension relates to input modality (visual or non-visual), mobility (the need to move around versus need to sit quietly), and time of day (morning person versus evening person) (Feaster, 1998).

Research that has been conducted by Tony Gregorc looked at the different functions that the left and right hemispheres of the brain perform. One of his key ideas is that human beings need to make sense of their world through specific mental qualities which enable us to perceive and order the world around us. Some environmental conditions and ways of thinking are attractive to us while others are not (Feaster, 1998).

Gregorc has identified two mind qualities (perception and ordering) within four basic mediation channels. Our world of reality can be concrete (detectable through physical sensory abilities) or abstract (detectable through non-physical world of thoughts and mental constructions). Our ordering ability can be either sequential (ordered, sequential, one-or two-

dimensional) or random (non-linear and multi-dimensional). The four channels Gregorc described are concrete sequential, abstract sequential, abstract random, and concrete random. Each style has differing ways of viewing time, thinking, validating, and creating (Feaster, 1998).

Further research has been conducted by Bernice McCarthy in the area of Right/Left Mode Techniques. Teaching and learning styles are combined with emphasis on techniques to activate the left and right hemispheres of the brain. She describes 4MAT as an open-ended teaching method designed to help teachers understand why some things work with some learners and not with others. Two major premises are that students perceive and process their experiences and information in different ways, and that learners need to be comfortable about their own styles (Feaster, 1998).

McCarthy has identified four types of learners. Type One learners are mainly interested in finding personal meaning. They perceive information concretely and process it reflectively. Type Two learners are interested in facts as they lead to concepts. They perceive information abstractly and process it reflectively. Type Three learners are interested in how thing work. They perceive information abstractly and process actively. Type Four learners are interested in self-discovery. They perceive information concretely and process it actively (Feaster, 1998).

McCarthy's research reinforces David Kolb's Experiential Learning Theory (ELT). According to Kolb, there are four stages of learning: the concrete experience, the reflective observation, the abstract conceptualization, and the active experimentation. Over time

individuals develop preferences for specific dimension based on their personal experiences, personality differences, environmental factors, and prior educational factors. Kolb's research corresponds with the work conducted by Dunn and Dunn in the discovery that there are learning modality preferences such as auditory, visual, or tactile/kinesthetic. The concepts of brain hemisphere dominance according to Kolb (Sims, 1995) and Gregorc, (Feaster, 1998) plays a role in the development of learning style.

Learning styles are different for all types and ages of students. Learning styles can be applied to all learners even adult learners. Research that has been conducted by William Purkiss, examined the re-entry adult learner. Mr. Purkiss conducted a community college study that examined the relationship between student learning style and academic success across the entire college curriculum. The results of his study concluded that the synthesis of various styles resulted in a higher level of learning. Purkiss also pointed out that particular learning styles seemed better suited for particular learning environments, and that the adult learners performed better in environments and with approaches that complemented their learning styles (Sims, 1995).

In order to be an effective educator, current research illustrates that teaching must combine several approaches, or multi-sensory instruction, so the student uses more than one sense at a time while learning. Multi-sensory approaches work well because of the way our brain is organized. When we learn, information takes one path into our brain when we use our eyes, another when we use our ears, and a third when we use our hands. By using more than one sense, we bombard our brain with the new information in multiple ways. As a result we learn better (Setley, 1995).

Learning style affects how a person acts in a group, participates in activities, relates to others, and solves problems. Knowing your learning style preferences can help you plan for activities that take advantage of your natural skills and inclinations (Johnston, 1997). According to the noted educator Sandra Rief, students retain: 10% of what they read, 20% of what they hear, 30% of what they say, 50% of what the see, 70% of what they see and hear, and 90% of what they say or do (Setley, 1995).

According to leading learning specialists, when looking for ways to help a student, strengths are just as important as weaknesses; the majority of the learning specialists believe that effective learning is most likely to happen when both strengths and weaknesses are considered. Many specialists believe that it is also important to help each child recognize hi or her strong points for the sake of his or her self-esteem (Setley, 1995).

Research that has been conducted by Bill Hinar has been organized into percentages of type of learning style the majority of 1-12 grade(s) students in the United States are classifie 45% of the students in the United States are considered to be visual learners, 30% are tactile/kinesthetic/experiential learners, and 25% are considered to be auditory learners (Hinar, 1998).

In order to understand each category of learning style the following chart was taken from Carolyn Cropper's article, "Learning Styles and Associated Traits," (Sept. 12, 1994).

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for the chart illustration

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Learning Styles & Associated Traits

Learning Style	*Traits*
Auditory Learning "I hear": learn best thru hearing, using their ears and their voices as the primary way to learn. These learners	1. Remember what they hear and their own verbal expressions 2. Remember by talking aloud and through verbal repetition 3. Desire to talk through a concept not understood 4. Verbally express excitement about learning 5. Can remember verbal instructions without recording them 6. Enjoy class discussions and talking with others
Visual Learning "I see": visual learners learn best thru seeing, using their eyes as the primary way to learn. These learners	1. Desire to see words written down 2. Prefer written instructions for assignments 3. Carefully organize their learning materials 4. Remember and understand thru the use of diagrams, charts and maps 5. Appreciate presentations using overhead cells or handouts 6. Observe all physical elements in a classroom
Kinesthetic Learning "I do": Kinesthetic learners learn best thru touch, using their hands as the primary way to learn. These learners:	1. Become physically involved in the subject being studied 2. Enjoy making a product or completing a project 3. Remember and understand thru doing something 4. Physically express enthusiasm by getting active and excited 5. Enjoy using computers 6. Enjoy hands-on art activities

Considering that 45% of the students that are in our nation's schools today are visual learners (Hinar, 1998), the question that has been posed many times by educators is what educational or media tool would be the most effective to aid in instructional needs, and what type of learner does better on standardized test or evaluations of cognitive growth and retention? According to research conducted by Lloyd Rieber, the visual learner will perform higher on standardized tests than non-visual learners because the vast majority of educators present material or content in a fashion that the traits of visual learner can be easily utilized to aid in the achievement of grasping the course material (Rieber, 1994).

In the area of visual media tools, Rieber believes that the learning environments that are computer-based benefit the visual learner more than any other learning style. The computer has the potential to become one of our most important cognitive tools, similar to the way the paper and pencil reduced the demands on human memory. Highly visual computer-based learning environments allow individuals to grapple with sophisticated ideas from math and science in visual ways that are all at once concrete (Rieber, 1994).

The question still remains to be answered as to whether or not visual learners perform higher on standardized tests than do non-visual learners. If visual learners do possess the essential traits needed to perform higher on standardized tests, then visual learners should have higher achievement scores. This study looks at these questions.

Statement of the Problem

Does a student's learning style help determine how well he or she does on a standardized test? Does a particular learner's trait(s) determine the achievement level of a student? Do those students that are classified as visual learners perform better on standardized tests than those that are classified as non-visual learners?

One directional hypothesis was tested in this study:

1. Students that are classified as visual learners will score higher on standardized tests than those students that are classified as non-visual learners because visual learners possess the traits needed to do well on standardized tests.

Methodology

The study used (33) visual and (33) non-visual adult learners in the adult basic educational program at Putnamville Correctional Facility as the sample group. The Vocational Learning Styles Inventory , Piney Mountain Press, Inc., was used to determine the learning style of each student used in the study. The students were randomly picked by the computer's data base. The Tests of Adult Basic Education (T.A.B.E.) Form 6 Level D was used to obtain mean scores from each group in the area of vocabulary, comprehension, math concepts, and math computation. Because of the size and nature of the sample, it could be reasonably concluded that this sample is not representative of the students found in all public schools in this country.

This study had an independent non-correlational design that used the data to compute an independent two tailed t-test. A zenith computer, with software that computed the mathematical data of the two groups and assessed the vocational learners style inventories, was the only equipment used.

A t-test was performed in the area of vocabulary; results were 1.737 which was significant at the 0.05 level for a two tailed test with 64 degrees of freedom.

A t-test was performed in the area of reading comprehension; results were 2.061 which was significant at the 0.05 level for a two tailed test with 64 degrees of freedom.

A t-test was performed in the area of math concepts; results were 2.054 which was significant at the 0.05 level for a two tailed test with 64 degrees of freedom.

A t-test was performed in the area of math computation; results were 2.373 which was significant at the 0.05 level for a two tailed test with 64 degrees of freedom.

Results

As a result of the t-test, a 1.19 t-value was found in the area of vocabulary. A t-value in the area of comprehension was 1.72. A t-value in the area of math concepts was .69, and in the area of math computation a t-value of .95 was found. All t-values resulted in a significance at the 0.05 level.

Do to these findings, the null hypothesis is rejected and this positive relationship between visual learners and higher achievement scores was expected and paralleled the directional hypothesis.

The two graphs, one being a bar graph and the other a line graph, both illustrate the difference in mean scores of visual (1) and non-visual (2) learners in the area of vocabulary, comprehension, math concepts, and math computation. The visual students had higher mean scores in all areas.

The mean and standard deviation for group (1) visual learners and group (2) non-visual learners in vocabulary, comprehension, math concepts, and math computation are shown in Table 1:

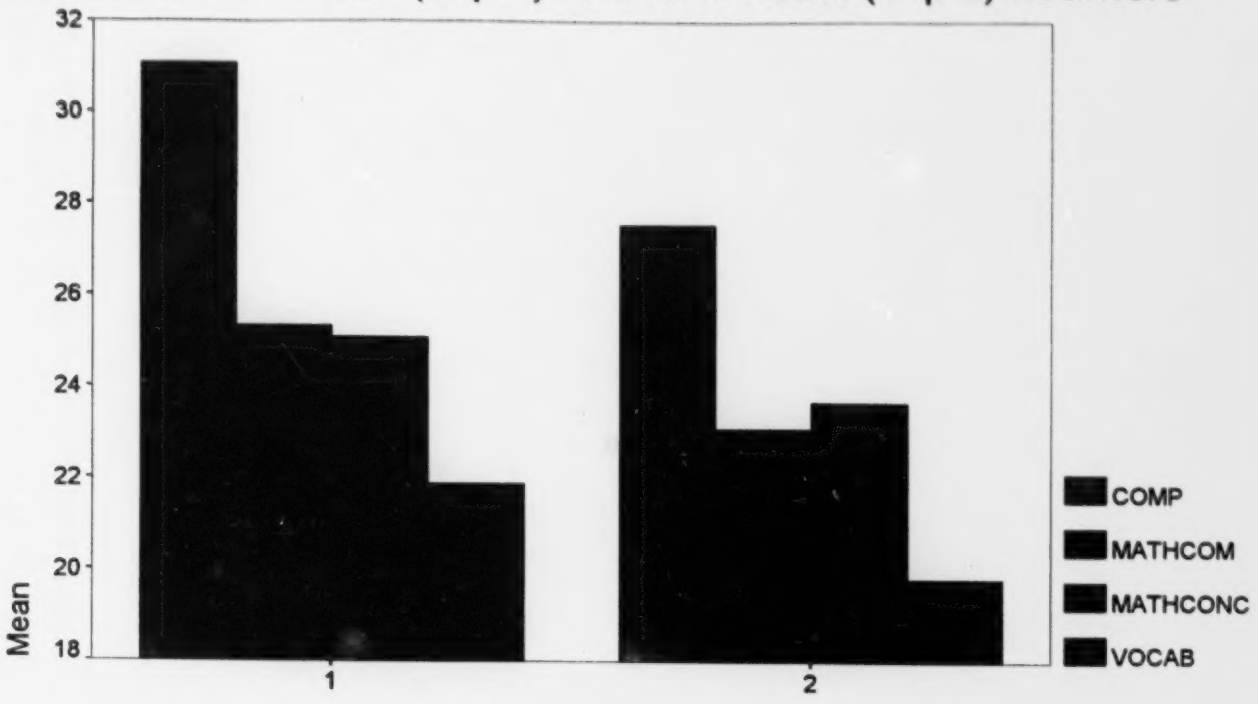
	Visual Learners (1)		*Non-Visual Learners (2)*	
	Mean Score	Standard Dev.	Mean Score	Standard Dev.
Vocab.	21.8788	6.323	19.8182	7.720
Comp.	31.0909	7.239	27.5455	9.368
Math Concepts	25.0909	7.887	23.6667	8.774
Math Computation	25.3333	10.255	23.0909	8.980

The t-values and significance are illustrated in Table II for vocabulary, comprehension, math concepts, and math computation.

Statistical Analysis of the Hypothesis

Comparison	t-value	Significance
Vocabulary	1.19	.240
Comprehension	1.72	.090
Math Concepts	.69	.491
Math Computation'	.95	.348

Mean Scores of Visual (Grp.1) and Non-visual (Grp.2) Learners



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Mean Scores of Vis. (Grp.1) and Non-vis. (Grp. 2) Learners
32
30
28
26
24
22
20
18
Mean
1
2
GROUP
COMP
MATHCOM
MATHCONC
VOCAB

Discussion, Conclusions, and Recommendations

The relationship found between visual learners and higher achievement scores was expected. The results found were significant and did not cause the hypothesis to be rejected. There were two major factors that could have caused these results.

The visual learners had the highest mean score in the area of reading comprehension; this may be do the fact that reading requires the learning traits that are best suited for visual learners. Because standardized tests require the use of learner traits predominately found in visual learners, are standardized tests a valid source for assessment of achievement?

Finally, the students that were used for this sample were adult learners, so the sample might not be representative of the general population. An argument that could be raised is do all people or students perform better on standardized tests that are considered to be visual learners? In order to effectively answer this question, this study should be repeated with a different sampling method that would be more representative of the total population.

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